

DRSAR/SA/N-78

SYSTEMS ANALYSIS DIRECTORATE

ACTIVITIES SUMMARY

MAY 1978

**TECHNICAL
LIBRARY**

JUNE 1978

Approved for public release; distribution unlimited.



US ARMY ARMAMENT MATERIEL READINESS COMMAND

SYSTEMS ANALYSIS DIRECTORATE

ROCK ISLAND, ILLINOIS 61299

DISPOSITION

Destroy this report when no longer needed. Do not return it to the originator.

DISCLAIMER

The findings in this report are not to be construed as an official Department of the Army position.

WARNING

Information and data contained in this document are based on input available at the time of preparation. Because the results may be subject to change, this document should not be construed to represent the official position of the US Army Materiel Development & Readiness Command unless so stated.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER DRSAR/SA/N-78	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) SYSTEMS ANALYSIS DIRECTORATE ACTIVITIES SUMMARY - MAY 1977		5. TYPE OF REPORT & PERIOD COVERED Note - Final
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS US Army Armament Materiel Readiness Command Systems Analysis Directorate (DRSAR-SA) Rock Island, IL 61299		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS US Army Armament Materiel Readiness Command Systems Analysis Directorate (DRSAR-SA) Rock Island, IL 61299		12. REPORT DATE June 1978
14. MONITORING AGENCY NAME & ADDRESS (If different from Controlling Office)		13. NUMBER OF PAGES 38
		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Additions or deletions of addresses to/from the distribution list are invited and should be forwarded to the address below. Inquiries pertinent to specific items of interest may be forwarded to Commander, US Army Armament Materiel Readiness Command, ATTN: DRSAR-SA, Rock Island, IL 61299 (AUTOVON 793-4483/4628).		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Engineering in Direct Support of Production (EDSP) Engineering Studies Budget Procurement Program		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The purpose of this study was to compare the Engineering in Direct Support of Production (EDSP) costs from FY 74 through FY7T for selected items and to provide a basis for comparing and predicting future costs for budget planning. A review of six items showed that the average percent of the total program costs represented by the EDSP charges ranged from 1.78% for the 5.56mm cartridge to 10.42% for the M8 alarm series. Total EDSP charges for these six items represented 3.10% of total program costs. (OVER)		

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

20. ABSTRACT (Cont'd)

The sample size was too small and time period represented too short to identify commonalities in these EDSP costs that might be used for predicting.

The recommendation was made that a standard 3% for EDSP for each end item be included in the budget. Significant deviations would have to be fully justified on an exception basis.

1001

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

CONTENTS

	<u>Page</u>
Historical Review of Costs for Engineering in Direct Support of Production (EDSP)	5
DISTRIBUTION LIST	35

Next page is blank.

DRSAR-SAL

2 APR 1978

MEMORANDUM FOR RECORD

SUBJECT: Historical Review of Costs for Engineering in Direct Support of Production (EDSP)

PURPOSE

1. The purpose of this review was to compare the EDSP costs from FY74 through FY77 for selected items in an attempt to predict ARRCOM budget requirements for engineering support.

REFERENCES

2. Initial request and data responses are as follows:
- a. DF, DRSAR-SAL, 6 Apr 77, Historical Review of Engineering Support Costs.
 - b. CMT 2, DRSAR-CPB-P, 20 Apr 77, subject same as a.
 - c. CMT 3, DRSAR-PDP-R, 13 June 77, subject same as a.
 - d. CMT 2, DRSAR-PDV, 11 Jul 77, subject same as a.

BACKGROUND

3. The Logistics Engineering Directorate asked this office to evaluate the engineering services in direct support of production as one of the factors that might be responsible for increases in the cost of ARRCOM munitions. Currently, no known method exists for controlling or predicting these costs because the Command does not allocate them across the end items in a fixed manner.
4. ARRCOM Regulation 700-8 divides PEMA production support engineering into general support, engineering studies, malfunction investigations, and product improvements. This study was restricted to the general support efforts which are defined as: "Engineering which directly supports tasks basic to the item's manufacture such as process, production, inspection, quality, and other engineering work which is essential to start-up and continuation of an item's production. This type of support involves quality

DRSAR-SAL

25 APR 1978

SUBJECT: Historical Review of Costs for Engineering in Direct Support of Production (EDSP)

engineering, contractor plant visitation, the evaluation and implementation of engineering changes (value engineering proposals, change proposals, requests for waivers and deviations, and related testing and test agency support), technical data package and engineering documentation updating, and other related liaison and coordination activity."

5. The funding cycle involved is as follows: The Comptroller issues a 1006 to the Production Directorate authorizing the issuance of PEMA funds for the engineering support work. PD then issues a 1095 (Procurement Request Order Number - PRON) to the people who will be doing the work. The cycle ends with the Comptroller who is subsequently responsible for paying for the work performed. Therefore, the engineering support costs used for this review were obtained from the Production Directorate (DRSAR-PDP-R and PDV) to verify whether or not 1095's have been issued for the 1006.

6. This review was restricted to the following representative items selected by the Logistics Engineering Directorate:

CTG, 5.56mm, M193

Mask, M17A1

M8 Alarm Series

81mm Mortar, M29A1

Recoilless Rifle, M67

155mm Self-Propelled Howitzer, M109A1/M109A1B/M109A2

7. PM-managed items were purposely excluded from this list and three of the representative items initially selected by the Directorate were deleted. The last procurement of the M590 90mm cartridge was in FY68 and the cost data were not readily available. Nor were cost data provided for the M509 fuze because it is procured only as a component and the engineering support is charged to the end items. The M119 155mm propelling charge was also dropped.

SUMMARY OF RESULTS

8. This evaluation consisted of determining what portion of the total fiscal year procurement for each item was spent on EDSP and then comparing these percentages to see if there was any commonality among them. Table 1 shows the respective costs for each fiscal year and the proportionate share spent on general engineering support. Comments about each program have also been included.

Table 1

COMPARISON OF ENGINEERING SUPPORT
AND TOTAL PROGRAM COSTS
FOR SELECTED ARRCOM ITEMS

ITEM	FISCAL YEAR	TOTAL COST (\$)	ENGINEERING SUPPORT COST (\$)	% OF TOTAL COST REPRESENTED BY ENGINEERING SUPPORT	COMMENTS
Ctg 5.56mm, M193	74	94,631,256	1,290,193	1.36	A high volume production item. Problems with dispersion and bullet jacket material. Production continuing at Lake City AAP. No FY 7T buys.
	75	36,910,729	1,060,199	2.87	
	76	4,854,000	89,000	1.83	
	7T	0	0	-	
	TOTAL	136,395,985	2,439,392	1.78	
M17A1 Mask	74	8,689,721	1,228,344	14.14	Long procurement history with initial buy in 1961. Small current buy for foreign sales. FY 74 start-up on this particular contract. Anticipated problems with rubber formulations and gas filter element. No FY 7T buy.
	75	6,763,775	152,934	2.26	
	76	20,200	0	-	
	7T	0	0	-	
	TOTAL	15,473,696	1,381,278	8.93	

25 APR 1976

Table 1 (Cont)

COMPARISON OF ENGINEERING SUPPORT
AND TOTAL PROGRAM COSTS
FOR SELECTED ARRCOM ITEMS

ITEM	FISCAL YEAR	TOTAL COST (\$)	ENGINEERING SUPPORT COST (\$)	% OF TOTAL COST REPRESENTED BY ENGINEERING SUPPORT	COMMENTS
M8 A1 arm Series	74	2,032,000	508,000	25.0	Large procurement with contractor finally meeting peak production rate. Start-up of a contract and the revision of IDP with over 600 changes and 150 deviations. Anticipated problems with liquid reaction concept used in M43 detector, the refill kit for the detector, and methods for winterizing batteries.
	75	16,067,655	2,129,229	13.25	
	76	1,800	179	9.94	
	7T	8,942,624	179,450	2.0	
	TOTAL	27,044,079	2,816,858	10.42	
81mm Mortar Tube, M29A1	74	2,765,396	165,100	5.97	This tube has a long procurement history. Basically contracts on spare parts. In FY74 work done on base plate modification. No FY 7T engineering support funds pending release of contract. Future work on tube held up pending results of Army's evaluation of the British L16A2 mortar.
	75	1,896,580	82,945	4.37	
	76	1,132,283	19,700	1.74	
	7T	118,788	0	-	
	TOTAL	5,913,047	267,745	4.53	

Table 1 (Cont)

COMPARISON OF ENGINEERING SUPPORT
AND TOTAL PROGRAM COSTS
FOR SELECTED ARRCOM ITEMS

ITEM	FISCAL YEAR	TOTAL COST (\$)	ENGINEERING SUPPORT COST (\$)	% OF TOTAL COST REPRESENTED BY ENGINEERING SUPPORT	COMMENTS
Recoilless Rifle, M67	74	859,991	82,459	9.59	Now being replaced by DRAGON missile system. All production now for foreign military sales. Large buy (1144 items) in FY 76. EDSP started earlier because a new contractor is involved. Problem of cracked breech blocks has been solved but not implemented because Army figures it is not cost effective to modify current inventory. No FY 7T buys.
	75	843,535	77,765	9.22	
	76	1,024,698	50,400	4.92	
	7T	0	0	-	
	TOTAL	2,728,224	210,624	7.72	
155mm Self-propelled Howitzer, M109A1/M109A1B/ M109A2	74	72,588,247	2,188,591	3.02	Costs against the M109A1B; M109A1 was a PIP-generated item. The A2 will start production next year. A1B for foreign military sales only, never has been built for US inventory. Most of EDSP reflective of different modifications required for foreign military sales.
	75	81,584,581	1,386,638	1.70	
	76	53,736,500	1,718,100	3.20	
	7T	14,497,426	317,675	2.19	
	TOTAL	222,406,754	5,611,004	2.52	

NOTE: All costs adjusted to FY 76 dollars.

DRSAR-SAL

2 5 APR 1972

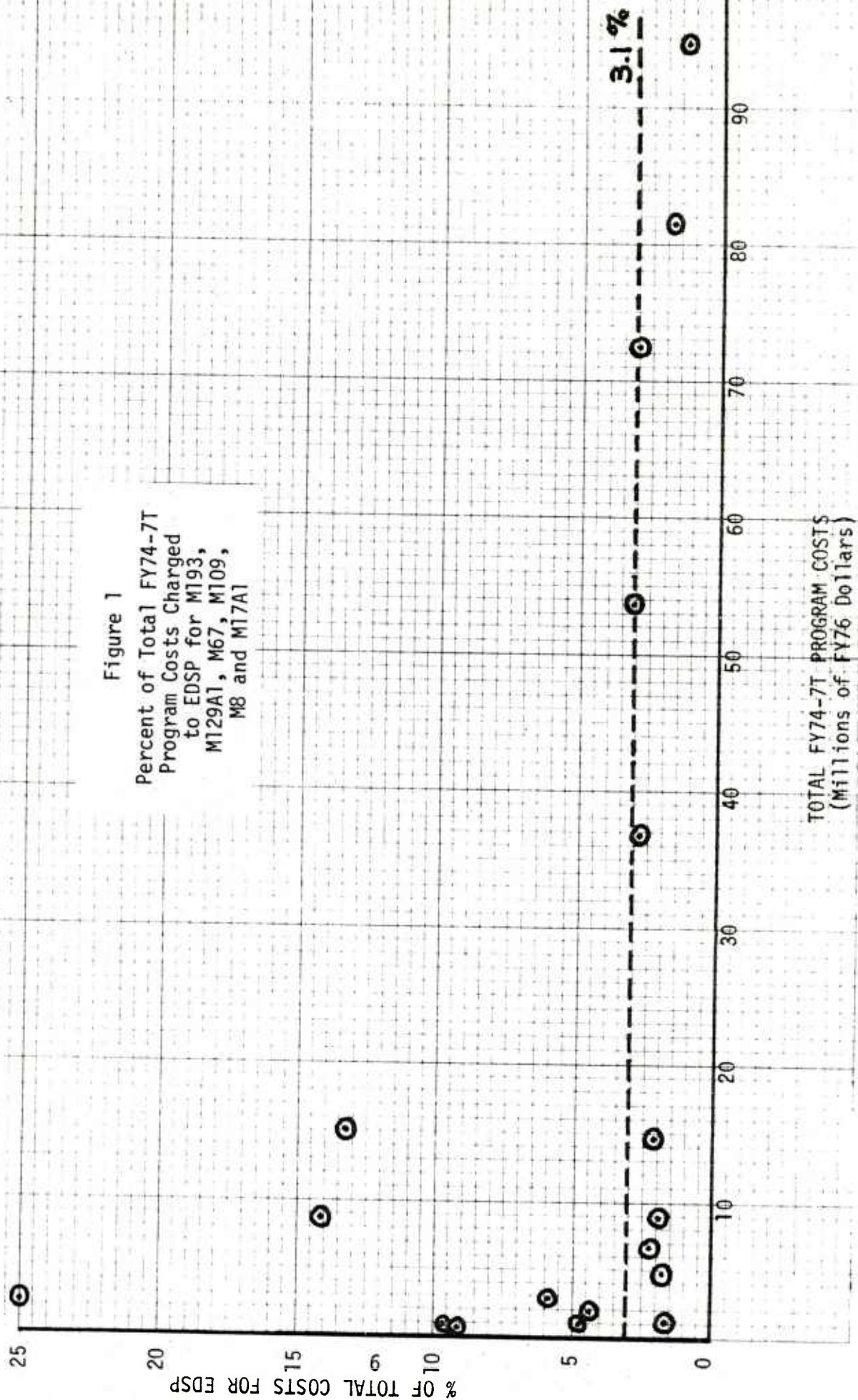
SUBJECT: Historical Review of Costs for Engineering in Direct Support of Production (EDSP)

9. It is expected that the engineering support costs will be highest at the beginning of the initial production. These charges may also rise during subsequent production start-ups - particularly if the contractor was changed and/or the technical data package needs to be updated. It is also important to remember that these costs represent the year of issue and the funds may be spent over a period of time.

10. The percent of total costs represented by engineering support ranged from 1.78 for the 5.56mm cartridge to 10.42 with the M8 alarm series. The most consistent as well as lowest percentage of engineering support was required for the 5.56mm cartridge, a high volume item still in production at the Lake City Army Ammunition Plant. Largest of the total costs was used for the M8 series alarms and M17A1 mask, both of which seem to be characterized by numerous problems as indicated in Table 1.

11. Figure 1 is a plot showing the percentages of the total FY74-7T program costs charged to EDSP for these six items. This was done to illustrate the relative scatter of EDSP charges whose total was only 3.10 percent of total program costs totalling 409 million dollars.

Figure 1
Percent of Total FY74-7T
Program Costs Charged
to EDSP for M193,
M129A1, M67, M109,
M8 and M17A1



DRSAR-SAL

SUBJECT: Historical Review of Costs for Engineering in Direct Support of Production (EDSP)

DISCUSSION

12. It is evident that each of these items is an individual case with its own variable demands for engineering support. These six items constitute a very limited sample and only a small part of their total production history is represented. Consequently, the short period of time (3-1/4 years) represented by these cost data could not be used to identify trends in demands for engineering support or to make comparison with the previous EDSP requirements. The results of the analysis indicated that the total EDSP charges for these items represented 3.10 percent of the total program costs.

13. Until recently an analysis of engineering support costs was being furnished to DA by DRSAR-PPM as supporting documentation for FY budget estimates for Army ammunition appropriations.* Discontinued in late 1976, this annual report used actual and forecasted cost data to break down general support, product improvements, engineering studies and malfunctions investigations into respective percentages of the total procurement and the total engineering programs. Inclosures 1-4 are the summary tables from these reports and collectively they show that the general support (EDSP) engineering for all of the Army items averaged 2.23 percent (actuals 2.33 percent, forecast 2.16 percent) of the total program. By contrast, the total spent for EDSP on these six items was 3.10 percent of the total procurement. However, the total EDSP charges for the only ammunition item (M193 5.56mm cartridge) were only 1.78 percent of the total procurement.

14. Since the EDSP demands are presumed independent, a frequent review of these costs may be the best and most practical way of analyzing them. And part of the data to do this with could be furnished by the APARS (Army Procurement Authority Accounting and Reporting System - formerly PEMARS - AR 37-120) system. Its monthly program status summary shows the authorized, issued, obligated, unobligated, and disbursed funds for each program. Each program/production manager receives the status summaries on his programs. Contact with the manager may be necessary to insure that his engineering support does not include PIP's, malfunction reports, and engineering studies. If needed, this computerized system could be programmed to calculate the percentage of the authorized total covered by engineering support and give the program manager a monthly update on EDSP requirements. The APARS system does not include the Army stock fund items.

* PA, A Budget Estimate Supporting Documentation for the Class V Ammunition Support Engineering Program.

25 APR 1978

DRSAR-SAL

SUBJECT: Historical Review of Costs for Engineering in Direct Support of Production (EDSP)

15. The ARRCOM munitions are unit priced according to the actual manufacturing and support costs incurred during the last buy of the item. Fixed percentages are not used to represent the additional cost of engineering support, quality assurance, and proof/acceptance testing. Therefore, determining the effect of these EDSP costs on the unit price of the item requires consideration of variations in the size of the buys and other possible manufacturing variables. Because the Class V replacement prices identify a base price and procurement factor for engineering support, Table 2 shows the percent of the total price attributed to this service for the time periods indicated. Unfortunately, buys on weapons are less frequent and it was not possible to readily obtain this information for every time period in Table 1.

Table 2

STANDARD REPLACEMENT PRICES AND ENGINEERING
SUPPORT COSTS FOR SELECTED ARRCOM ITEMS

Item	Fiscal Year	Standard Adjusted Price (\$)		% of Total Represented by Engineering Support
		<u>Total</u>	<u>Engineering</u>	
Ctg 5.56mm, M193	75	0.0596	0.0012	2.01
	76	0.0714	0.0014	1.96
	77	0.0752	0.0011	1.46
M17A1 Mask	76	69.76	4.32*	6.19
	77	72.84	4.51*	6.19
	77	76.52	4.74*	6.19
M8 Alarm Series	76	1768.68	179.12	10.13
	77	1846.32	186.98	10.13
	77	1939.88	196.46	10.13
81mm Mortar Tube, M29A1	79	5372.00	506.00	9.42
	80	5612.00	419.00	7.47
Recoilless Rifle M67	78	5795.00	1041.00	17.96
	79	5795.00	1103.00	19.03
	80	6889.00	779.00	11.31
155mm Self- Propelled Howitzer, M109	79-80	134,534.00	7868.00	5.85
	81	144,079.00	8282.00	5.75
	82	151,851.00	8614.00	5.67

*Costs also include quality assurance

DRSAR-SAL

2 5 APR 1978

SUBJECT: Historical Review of Costs for Engineering in Direct Support of Production (EDSP)

A comparison of these percentages with those for each fiscal year in Table 1 (recognizing that the time periods may not coincide) showed a similarity only with those for the M193 cartridge. The percentages for the M17A1 mask and the M8 alarm suggest that a factor was used. Overall, this comparison does not suggest a correlation between these EDSP costs and the amount of engineering support reflected in the standard unit price.

16. Alternative methods of funding EDSP are compared by the inclosed Memorandum for Record (Incl 5). If these costs were to be covered by a single budget line (similar to malfunction investigations), a standard percentage, or bulk-funded like the Army stock fund, this MFR indicated that for FY71-78 it could have been requested at the historical average rate of 2.9 percent of the procurement program. This percentage is almost identical to the 3.10 average percent for the six items used in this review and a little higher than the total average (2.33 percent) from the previously cited summary tables in Inclosure 1-4. It appears that ARRCOM needs to budget at least 3 percent for EDSP.

CONCLUSIONS

17. This historical review of EDSP costs for the selected items indicated:

a. This average percent of total program costs represented by the EDSP charges ranged from 1.78 for the 5.56mm cartridge to 10.42 with the M8 alarm series. Total EDSP charges for the six items used in this review represented 3.10 percent of the total program costs.

b. The sample size was too small and time period represented too short to identify commonalities in these EDSP costs that might be used for predictive purposes.

c. Continuing efforts by management are needed to collect more data for estimating EDSP costs.

5 Incl

1. Anal Eng Sup Prog, Oct 74
2. Anal Eng Sup Prog, Jun 75
3. Anal Eng Sup Prog, Aug 75
4. Anal Eng Sup Prog, Aug 76
5. MFR, 17 Feb 78



ROGER W. POWELL
Operations Research Analyst
Logistics Systems Analysis Division

ANALYSIS OF ENGINEERING SUPPORT PROGRAM
IN RELATION TO THE TOTAL AMMUNITION PROGRAM

4 OCT 1974

	ACTUALS			FORECAST	
	<u>FY72</u>	<u>FY73</u>	<u>FY74</u>	<u>FY75</u>	<u>FY76</u>
AMMO Proc Prg	\$1,469.800	\$1,115.600	\$732.400	\$586.800	\$479.700
Total Eng Spt	46.901	28.547	20.610	13.214	13.413
% of Proc	3.191	2.559	2.814	2.252	2.796
General Spt	26.538	18.375	17.176	11.290	10.694
% of Proc	1.805	1.647	2.345	1.924	2.229
% of Tot Eng	56.583	64.368	83.338	85.440	79.729
Process Imp	2.360	0.000	0.000	0.000	0.000
% of Proc	0.161	-	-	-	-
% of Tot Eng	5.032	-	-	-	-
Gen Spt & Proc	28.898	18.375	17.176	11.290	10.694
% of Proc	1.966	1.647	2.345	1.924	2.229
% of Tot Eng	61.615	64.368	83.338	85.440	79.729
Prod Imp	18.003	10.172	3.434	1.924	2.719
% of Proc	1.224	0.912	0.469	0.328	0.567
% of Tot Eng	38.385	35.632	16.662	14.560	20.271

SOURCE:

PA, A Budget Estimate Supporting Documentation for the Class V Ammunition Support Engineering Program. DRSAR-PPM (Discontinued late 1976).

Incl 1

17 JUN 1975

ANALYSIS OF ENGINEERING SUPPORT PROGRAM
IN RELATION TO THE TOTAL AMMUNITION PROGRAM

	ACTUALS		FORECAST	
	<u>FY74</u>	<u>FY75</u>	<u>FY76</u>	<u>7T</u>
AMMO Proc Prg	\$746.600	\$468.100	\$444.200	\$100.100
Total Eng Spt	31.051	12.523	14.475	2.229
% of Proc	4.159	2.675	3.259	2.227
General Spt	27.307	10.824	10.961	2.229
% of Proc	3.658	2.312	2.468	2.227
% of Tot Eng	87.942	86.433	75.724	100.000
Prod Imp	3.744	1.699	3.514	0
% of Proc	.501	.363	.791	0
% of Tot Eng	12.058	13.567	24.276	0

SOURCE:

PA, A Budget Estimate Supporting Documentation for the Class V Ammunition Support Engineering Program. DRSAR-PPM (Discontinued late 1976).

Incl 2

ANALYSIS OF ENGINEERING SUPPORT PROGRAM
IN RELATION TO THE TOTAL AMMUNITION PROGRAM

	<u>ACTUAL</u>	<u>FORECAST</u>		
	<u>FY75</u>	<u>FY76</u>	<u>FY7T</u>	<u>FY77</u>
AMMO Proc Prg	\$530.000	\$433.300	\$69.300	\$690.500
Total Eng Spt	12.613	14.934	1.006	18.647
% of Proc	2.380	3.447	1.452	2.701
General Spt	10.858	11.824	1.006	13.489
% of Proc	2.049	2.729	1.452	1.954
% of Tot Eng	86.086	79.175	100.000	72.339
Prod Imp	1.755	3.100	0	5.158
% of Proc	.331	.718	0	.747
% of Tot Eng	13.914	20.825	0	27.661

SOURCE:

PA, A Budget Estimate Supporting Documentation for the Class V Ammunition Support Engineering Program. DRSAR-PPM (Discontinued late 1976).

Incl 3

12 AUG 1976

ANALYSIS OF ENGINEERING SUPPORT PROGRAM
IN RELATION TO THE TOTAL AMMUNITION PROGRAM

	ACTUAL	FORECAST		
	FY76	FY77	FY77	FY78
AMMO Proc Prg	\$374.400	\$86.200	\$664.100	\$1068.500
Total Eng Spt	\$17.084	\$1.230	\$23.318	\$35.611
% of Proc	4.563%	1.427%	3.511%	3.333%
General Spt	\$9.373	\$1.230	\$16.200	\$29.589
% of Proc	2.503%	1.427%	2.439%	2.769%
% of Tot Eng	54.865%	100.000%	69.474%	83.089%
Prod Imp	\$5.239	0	\$6.511	\$5.192
% of Proc	1.399%	-	.981%	.486%
% of Tot Eng	30.666%	-	27.923%	14.580%
Eng Study	\$1.833	0	\$.607	\$.830
% of Proc	.490%	-	.091%	.078%
% of Tot Eng	10.729%	-	2.603%	2.311%
Malf Invest	\$.639	0	0	0
% of Proc	.171%	-	-	-
% of Tot Eng	3.740%	-	-	-

SOURCE:

PA, A Budget Estimate Supporting Documentation for the Class V Ammunition Support Engineering Program. DRSAR-PPM (Discontinued late 1976).

Incl 4

17 February 1978

MEMORANDUM FOR RECORD

SUBJECT: Methods of Funding Engineering in Direct Support of Production

1. Reference is made to:

a. Ltr, DRSAR-CP, 9 Sep 76, subject: Request for Establishment of a Budget Line in the Procurement of Ammunition, Army (PAA) Budget Exhibit P-1 for Malfunction Investigations (Incl 1).

b. Message, DAMA-CSM-C, 072027Z Feb 77, subject: Request for Establishment of a Budget Line in PAA Budget Exhibit P-1 for Malfunction Investigations (Incl 2).

c. Memorandum, OASA, 16 Aug 77, subject: Memorandum for ASA (IL&FM) (Incl 3).

2. Objective:

Determine the best way to provide funds for Engineering in Direct Support of Production (EDSP).

3. Alternatives:

Three alternatives and their advantages and disadvantages are presented in Inclosure 4.

4. Discussion:

a. The ammunition program and EDSP costs for FY71-78 are listed in Inclosure 5. The relationship between EDSP and the Total Ammunition Program is shown in Inclosure 6. EDSP is significantly correlated with the Total Ammunition Program as shown by the coefficient of +0.813. Fitting the line through the origin in Inclosure 6 is appropriate considering the zero-base budgeting now being used. Also, if there is no ammunition program, there is no need for supporting programs such as EDSP. The line in Inclosure 6 was fitted using the procedure in AMC Pamphlet 706-110, paragraph 5-4.2.3, in which the standard deviation is proportional to the independent variable. This line shows that: if alternative B or C method

Incl 5

DRSAR-SAL

17 February 1978

SUBJECT: Methods of Funding Engineering in Direct Support of Production

of funding is proposed, it could be requested at the historical average rate of 2.9% of the procurement program. This is the average EDSP percentage for FY71-78. However, Inclosure 7 shows that the EDSP as a percentage of the total program has been increasing an average of .17 percent per year during FY71-78. This increase can be seen in Inclosure 4. However, due to the great variability (standard deviation of 1.1%) from year to year in the EDSP percentages, statistical procedures indicate that the EDSP percentage rate is not significantly correlated with time. The correlation coefficient is +0.36.

b. The likelihood of getting a simplified EDSP budget justification and funding process should be assessed considering the following situations:

(1) A separate budget line for Malfunction Investigations was proposed in 1977 (see reference 1a). No decision has been made on the proposal by DA (see reference 1b). The \$3 million requested was not included in the approved program. A separate budget line for malfunction investigations has more merit than EDSP since specific malfunctions cannot be anticipated at the time budget justifications are prepared.


(2) The ASD (Comptroller) recommended deferral of \$7.2 million for the M110A2 and \$6.1 million for the M109A2 in-house engineering requirements pending presentation of supporting data in the FY78 program (see reference 1c). This indicates a desire in ASD(C) that in-house engineering be fully justified.

5. Recommendations:

a. Proceed with data analysis and modeling toward a viable proposal for Alternative B(2). Separate data and models are needed for major item procurement and conventional ammunition programs.

b. Propose Alternative B(2) to DARCOM when the data analysis and modeling to support it has been accomplished.

7 Incl
as


HAL W. STEPHENSON
MAJ, OD
Operations Research Analyst

9 Sep 1976

DRSAR-CP

SUBJECT: Request for Establishment of a Budget Line in the Procurement of Ammunition, Army (PAA) Budget Exhibit P-1 for Malfunction Investigations

Commander
US Army Materiel Development and Readiness Command
ATTN: DRCPP

1. Reference is made to Command Briefing for COL H. R. Bailey, DAMA-CSM, HQ ARMCOM, 14 Jul 76, subject: Control of PEMA Production Engineering Support Costs.
2. Request the establishment of a budget line in the Procurement Ammunition, Army, Appropriation for Ammunition Malfunction Investigations. This budget line will be utilized to fund the investigation of malfunctions of ammunition items occurring during the fiscal year. The value of the line should be \$3.0 million for FY 78 and FY 79, respectively.
3. Currently, malfunction investigations for ammunition items in production are funded as a part of the individual ammunition budget line. Since policy prohibits the budgeting for malfunction investigations, as a part of the budget line, program and funds approved for the procurement of ammunition items are diverted to cover this mission. This reduces the actual quantity of ammunition items that can be procured within the approved TOA.
4. Detailed justification and rationale for this request are included in the attached inclosure and tabs.
5. Approval of this request will provide a method of funding these mandatory investigations promptly without affecting other approved ammunition budget lines, provide better control of expenditures for the investigation, and provide visibility of total cost of this aspect of the Ammunition Program.

1 Incl
as

RECEIVED
WILLIAM E. EICHER
Major General, USA
Deputy Commanding General

CF: *Incl 1 of Incl 5*
HQDA (DAMA-CSM-C) w incl

RATIONALE AND JUSTIFICATION FOR BUDGET LINE
MALFUNCTION INVESTIGATIONS OF AMMUNITION ITEMS

1. Definition of Malfunction - A malfunction is defined as the failure of an item to function/perform properly and meet the purpose for which it is designed. This definition embraces two types of malfunctions, of which the latter is the type addressed in this request:

a. A production test failure; i.e., the failure of a round, or a component thereof, in production to meet any prescribed production test up to and including its final acceptance test.

b. The failure of an accepted and delivered round to properly function/perform when fired by the user/buyer.

2. Current Policy -

a. Current policy guidance governing the costing of malfunction investigations is provided in letter, AMCCP-BP, 24 Mar 72, subject: Funding of Inspections, Analyses and Tests of Army Materiel (TAB A), and reaffirmed in 1st Ind, AMCCP-BP, 14 Nov 74, to letter, AMSAR-CP, 8 Oct 74, same subject (TAB B). The interpretation of this guidance is that the PAA Appropriation must bear the cost of investigating the type of malfunction identified in paragraph 1, above, if the item is in production. The fact that one or more years may have elapsed between the final delivery of the procurement/production order under which the round that malfunctioned was produced, and the placement of the current procurement/production order, is of no consequence. The deciding factor as to whether the investigation is funded with PAA is that a round of the same model is currently being procured/produced for active Army stock.

b. To comply with the Army policy where a malfunction investigation is not to be delayed (AR 75-1, 2 Jul 75), HQ, ARMCCM established a policy under which engineering agencies, upon receipt of a bona fide malfunction investigation requirement, and provided that the item is in a procurement/production status, utilize authorized production engineering general support funds pending the submission of a malfunction investigation requirement funding request.

3. Background on Prohibition of Budgeting for Malfunction Investigations within the Ammunition Item Budget Line - During the FY 73 PAA Budget Estimate Review, DOD directed that malfunction investigations were not to be anticipated, programmed and included as an element in the budget line item's production engineering support budget estimate. This resulted in the deletion of these anticipated costs in the FY 73 PAA Budget Estimates, as well as the omission of these costs in subsequent fiscal year budget estimates. However,

Incl 1 to Incl 1 of Incl 5

this action did not relieve the PAA Appropriation of the responsibility to fund the cost of a malfunction investigation when the item which malfunctions is in a procurement/production status.

4. Rationale for not Including Malfunction Investigation Costs in the Budget Line Item Costs -

a. The practice of classifying the cost of a malfunction investigation as "engineering in direct support of production" is questionable. In almost all instances, the round which malfunctions in the hands of the user/buyer is not a round from current production which bears the cost of the investigation. Additionally, the "engineering in direct support of production" classification results in these costs becoming a part of the item's standard price. This, in turn, penalizes customers submitting future orders. He is assessed for a cost which did not/will not have a direct impact upon the production for which he is paying. Establishment of a separate budget line for this requirement will eliminate the questionable practice and result in closer adherence to the provisions of AR 37-60, 27 Apr 76.

b. The DOD decision during the FY 73 PAA Budget Estimate Review (in paragraph 3, above).

c. The US Air Force complaint to DOD that the Army was in violation of the DOD coordinated Procurement Program-Pricing Policy, and the OSD(C) decision related thereto (TAB C).

d. The US Marine Corps complaint to DOD that the Army was in violation of the DOD coordinated Procurement Program-Pricing Policy, and the OSD(C) decision related thereto (TAB D).

e. The provisions of AR 37-60, 27 Apr 76, Pricing for Materiel and Services.

f. ASPR 5-1113 which prohibits the ^{direct} assessment of other DOD components ~~for~~ administrative costs by the DOD procuring component; i.e., the inclusion of costs not directly related to procurement/production in the item's standard price.

g. As the Direct PAA Program decreases in value, and the value of the Reimbursable PAA Program approaches/surpasses the value of the former, it is becoming increasingly difficult for the former to meet the unprogrammed, unbudgeted malfunction investigation funding requirements. The majority of the Reimbursable PAA Program lines are direct delivery from production (RP) and payback of a sale from stock (RS) orders for which there is no corresponding Direct PAA Program line. Standing alone, no reimbursable PAA order provides sufficient funds to accommodate the funding of a malfunction investigation of moderate cost. The value of a reimbursable PAA order cannot

be increased by reprogramming funds from the Reimbursable (Customer) Unapplied Reserve Account; neither can additional customer program funding authority be obtained for the purpose to fund a malfunction investigation requirement.

5. Recommended Funding Level and Justification -

a. Recommended funding level - \$3,000,000.

b. Justification: The requested budget line, in the amount of \$3,000,000, is necessary to assure availability of funds with which to meet malfunction investigation requirements on rounds which malfunction when fired by user/buyer, and if the particular model is in procurement/production status.

(1) Per DOD verbal instructions during the FY 73 Budget Estimate Review, the budgeting of this requirement, based upon anticipation of such malfunction occurrences, was not permissible. This has resulted in an unbudgeted yearly requirement in excess of \$3,000,000 having to be met within available PAA (Direct Army) program funding authority. As reimbursable PAA orders cannot be increased to fund a malfunction investigation, the requirement must come from the Direct Army PAA.

(2) The following tabulation reflects the declining magnitude of the total PAA Program, beginning with FY 72, broken down to show composition by Direct Army and Reimbursable Army (Customer) procurements with the changing relationship of the former to the latter. The magnitude of malfunction investigation requirements funded beginning with FY 74 is also shown:

	<u>DOLLAR VALUE (\$000 OMITTED)</u>				
	<u>FY 72</u>	<u>FY 73</u>	<u>FY 74</u>	<u>FY 75</u>	<u>FY 76</u>
Total Ammunition Program	\$1,957,700	\$1,574,900	\$1,404,400	\$1,185,000	\$591,100
Direct	1,467,700	1,023,000	768,500	486,400	372,600
Reimbursable	490,000	551,900	635,900	698,600	218,500
Relationship (Direct Reimbursable)	3::1	1.8::1	1.2::1	.69::1	1.7::1
Malfunctions Exclude	a/	a/	7,413 4,135 b/ 3,278	4,091 .849 c/ 3,242	774 d

a/ Not identified in controls.

b/ The nature of this requirement involving the Ctg, 155MM, M483 (ICM) was such that this requirement does not qualify for purposes of subject request. A Malfunction Investigation Project No was assigned to contain and control cost only.

c/ The nature of this malfunction involving AXATEX-20 Tests, was such that this requirement does not qualify for purposes of subject request.

d/ Low magnitude is explained by the fact that normally, malfunction investigation requirements are not funded from the current fiscal year funds pending identification of unapplied funds normally reported at the close of each fiscal year. This figure can be expected to increase during FY 77.

(3) The above malfunction investigation funding requirements were met through reprogramming actions utilizing, in order, funds available in the Direct Army Unapplied Reserve Account and funds made available through "1415" actions. Unprogrammed and unbudgeted in the budget line item's production engineering support budget estimates, these malfunction investigation costs have contributed heavily to the constantly increasing current and prior year PEMA engineering costs reflected in affected item's P-22's at subsequent year Budget/Apportionment Reviews. This is particularly true of the tank rounds currently in production.

6. Proposed Controls - The establishment of a separate line in the budget of this nature requires strict controls to prevent abuse. To insure that the line is used only for the purpose approved, the following controls have been established:

a. Use of funds will be restricted to malfunction investigation to determine why an accepted and delivered round in the hands of the user/buyer failed to properly function/perform, provided a round of the same description and model is in a current procurement/production status.

b. The functions to be performed will be restricted to those required to satisfy only the requirements of AR 75-1, 14 Oct 69. This excludes all follow-on actions required to determine and accomplish corrective action, which will follow the ECO or Production Improvement Proposal route.

c. Each malfunction investigation, plan of investigation, will be screened and technically approved under the ARMCOM Malfunction Investigation Priority Evaluation System established as a supplement to AR 75-1, and will be assigned a number to contain and control costs and assure visibility.

7. Disadvantages - There is a minor disadvantage in attempting to obtain a separate budget line for malfunction investigations. DOD might be reluctant to go before Congress with the request inasmuch as malfunction investigation funds are also provided in the OMA Appropriation under OMA Account 738017, Total Maintenance Support Activities. It has been expressed that Congress might refuse the request stating it would constitute "double" funding. However, since the OMA Account covers malfunction investigations for items out of production, there is no double funding at the line level.

DISTRIBUTION

ACTION:

INFO : DRSAR-CP

N

RTTUZYUW RUEADWD3065 0382326-UUUU--RUCIAFB.

ZNR UUUUU

R 072027Z FEB 77

FM DA WASH DC//DAMA-CSM-C//

TO RUKLDAR/CDR DARCOM ALEX VA//DRCMM-RM//

INFO RUCIAFB/CDR ARMCOM ROCK ISLAND IL//DRSAR-CP//

BT

UNCLAS

SUBJECT: REQUEST FOR ESTABLISHMENT OF A BUDGET LINE IN PAA

BUDGET EXHIBIT P-1 FOR MALFUNCTION INVESTIGATIONS

A. LETTER, ARMCOM, DRSAR-CP, SUBJECT AS ABOVE, DATED 9 SEP 76,
WITH 1ST IND, DARCOM, DRCMM-RM, DATED 23 SEP 76.

1. THIS IS AN INTERIM RESPONSE TO REFERENCE ABOVE.

2. DURING THE RECENTLY CONDUCTED FY79-83 POM AMP REVIEW, A BUDGET
LINE WAS ESTABLISHED AT \$3 MILLION/YEAR FOR MALFUNCTION INVESTI-
GATIONS FOR FY'S 79-83. THIS IS SUBJECT TO APPROVAL BY THE
RDAC. IT IS ALSO SUBJECT TO COA DECISION AS TO WHETHER MALFUNCTION
INVESTIGATIONS SHOULD BE FUNDED BY PAA OR OMA. YOU WILL BE IN-
FORMED OF FINAL RESOLUTION.

3. FUNDING OF MALFUNCTION INVESTIGATIONS FOR FY79 WILL CONTINUE
TO BE HANDLED UNDER CURRENT PROCEDURES.

BT

#3065

Incl 2 of Incl 5

ROUTINE



OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

AUG 16 1977

COMPTROLLER
(Program/Budget)

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (IL&FM) ~~-----~~

There is transmitted herewith the schedule covering the Procurement of Weapons and Tracked Combat Vehicles, Army appropriation showing the amounts approved for obligation in the FY 1978 program and showing the items and amounts deferred for financing. Also attached are explanations of the reasons for deferral.

This schedule is subject to any Congressional action making appropriations available to the Department of Defense for Fiscal Year 1978 and to the following conditions and limitations:

1. This financial authority is issued for planning purposes only. No obligations are to be incurred prior to October 1, 1977.

2. The following total amount approved for obligation will not be exceeded without specific prior approval from the Office of the Assistant Secretary of Defense (Comptroller):

(\$ in Millions)

Procurement of Weapons and Tracked Combat Vehicles, Army	1,248.4
---	---------

3. The amounts not approved, i.e., deferred for financing, will not be obligated for any purpose without such specific prior approval. Requests for changes to, or release of items from the deferred list are to be submitted to the OASD(Comptroller) together with the prerequisite substantiating data.

The foregoing applies only to obligations for direct program. Changes between approved items and/or amounts may be accomplished only in accordance with DoD Instruction 7250.10.

For the period prior to apportionment of this account, reimbursable obligations are authorized in amounts equal to the value of reimbursable orders received and accepted.

RECEIVED
Enclosures

17 AUG 1977 14/131088

CRCTHE #

ADMIN. SUPPORT GROUP CSA

032273

Joseph H. Sherick

Deputy Comptroller (Program/Budget)

Header Rev. 1

Incl 3 of Incl 5

DEFERRED ITEMS ANALYSIS
FY 1978 INITIAL PROGRAM AND FINANCIAL PLAN

APPROPRIATION: Procurement of Weapons & Tracked Combat Vehicles, Army

ACTIVITY: 1 - Tracked Combat Vehicles

(In Millions of Dollars)

Quantity Amount

ITEM: Armd Recon Abn Assault M551 (Mod)

Service request	-	9.5
Recommended for deferral	-	9.5
Recommended for approval	-	-

ANALYSIS: Recommend deferral of \$9.5 million pending completion of the current Army tank study and subsequent determination as to disposition of the M551 vehicles.

ITEM: Improved TOW Vehicle, (ITV) (Mod)

Service request	-	51.5
Recommended for deferral	-	3.6
Recommended for approval	-	47.9

ANALYSIS: Recommend deferral of \$3.6 million identified as "Provisioning" pending clarification of this requirement. This item appears to duplicate effort funded under the Spares and Repair Parts program.

ITEM: Howitzer, Heavy, FT, SP, 8 inch,
M110A2

Service request	209	109.3
Recommended for deferral	-	7.2
Recommended for approval	209	102.1

ANALYSIS: Recommend deferral of \$7.2 million pending presentation of supporting data for "in house engineering" requirements for this program.

DEFERRED ITEMS ANALYSIS
FY 1978 INITIAL PROGRAM AND FINANCIAL PLAN

APPROPRIATION: Procurement of Weapons & Tracked Combat Vehicles, Army

ACTIVITY: 1 - Tracked Combat Vehicles

(In Millions of Dollars)

Quantity Amount

ITEM: Howitzer, Medium, SP, FT, 155mm
ML09A2

Service request 250 112.8

Recommended for deferral - 6.1

Recommended for approval 250 112.7

ANALYSIS: Recommend deferral of \$6.1 million pending presentation of supporting details for "in-house engineering" requirements in the FY 1978 program.

ITEM: Tank, Combat, FT, 105mm Gun, M60
Series

Service request 859 540.3

Recommended for deferral 79 78.7

Recommended for approval 780 461.6

ANALYSIS: Recommend deferral of 79 tanks and \$78.7 million based on final congressional action.

ITEM: Tank, Combat, FT, 105mm Gun, XM-1
Series, Adv Proc (CY)

Service request - 37.2

Recommended for deferral - .2

Recommended for approval - 37.0

ANALYSIS: Recommend deferral of \$.2 million for this new start procurement program based on final congressional action.

METHODS OF FUNDING FOR
ENGINEERING IN DIRECT SUPPORT OF PRODUCTION

<u>ALTERNATIVE</u>	<u>ADVANTAGES</u>	<u>DISADVANTAGES</u>
A. Procurement Appropriation funded (present system)	Planning by end item begins early. Program manager controls program support through PWD's. Funds are available during procurement spendout period.	Voluminous and costly justification and financial control process.
B. Procurement Appropriation funded with reduced justification and fiscal control requirements:	Minimum justification required. Funds are available during procurement spendout period. Description of tasks for each EDSP project needed <u>once</u> , prior to funding of PWD, to assure that services to be performed are properly chargeable to PAA.	
(1) Single EDSP budget line (similar to the Multifunction Investigation proposal)	Furnishes support when needed within overall allocation.	Cannot provide complete unit cost early enough for FMS Letters of Offer and Acceptance.
(2) Standard percentage used on each end item P-20 Form (a more sophisticated mathematical model could be used if available).	Only deviation above 3.8 percent would have to be formally justified. Satisfies need for total end item cost. Provides steadier level of effort in proportion to program.	Foreign governments may object to an EDSP add-on charge for items having little EDSP.

METHODS OF FUNDING FOR
ENGINEERING IN DIRECT SUPPORT OF PRODUCTION
(CONT'D)

<u>ALTERNATIVE</u>	<u>ADVANTAGES</u>	<u>DISADVANTAGES</u>
C. OMA bulk funded	Deletes reporting on PWD's and retains work measurement by end item. Dir/Log Engr has greater freedom to allocate effort as required. Control is through Manpower Survey.	Funds must be used in year of appropriation. Mixes a direct production expense into OMA. PAA should pre-cede OMA in Congress and consider previous years' programs being executed during the OMA budget year to determine EDSP fund requirement. Amendments to FMS cases would have to be issued to recoup costs. Manpower voucher would follow funds available in a given year. Differences in allocation of effort between Dir/Log Engr and Dir/Pdn may have to be resolved by Command Group

CLASS V AMMUNITION PROGRAM AND EDSP IN
MILLIONS OF FY 78 PURCHASING POWER DOLLARS

<u>FY</u>	<u>Total Program</u>	<u>EDSP</u>	<u>%</u>	<u>Source</u>
71	\$2,345.695	\$32.526	1.387	1
72	\$2,421.276	\$73.493	3.035	2
73	\$1,751.492	\$44.819	2.559	3
74	\$1,060.172	\$44.092	4.159	4
75	\$ 656.670	\$15.628	2.380	5
76	\$ 435.802	\$19.886	4.563	6
77	\$ 96.199	\$ 1.373	1.427	6
77	\$ 709.259	\$24.904	3.511	6
78	\$1,068.500	\$35.611	3.333	6
	Average	\$35.4	2.928%	

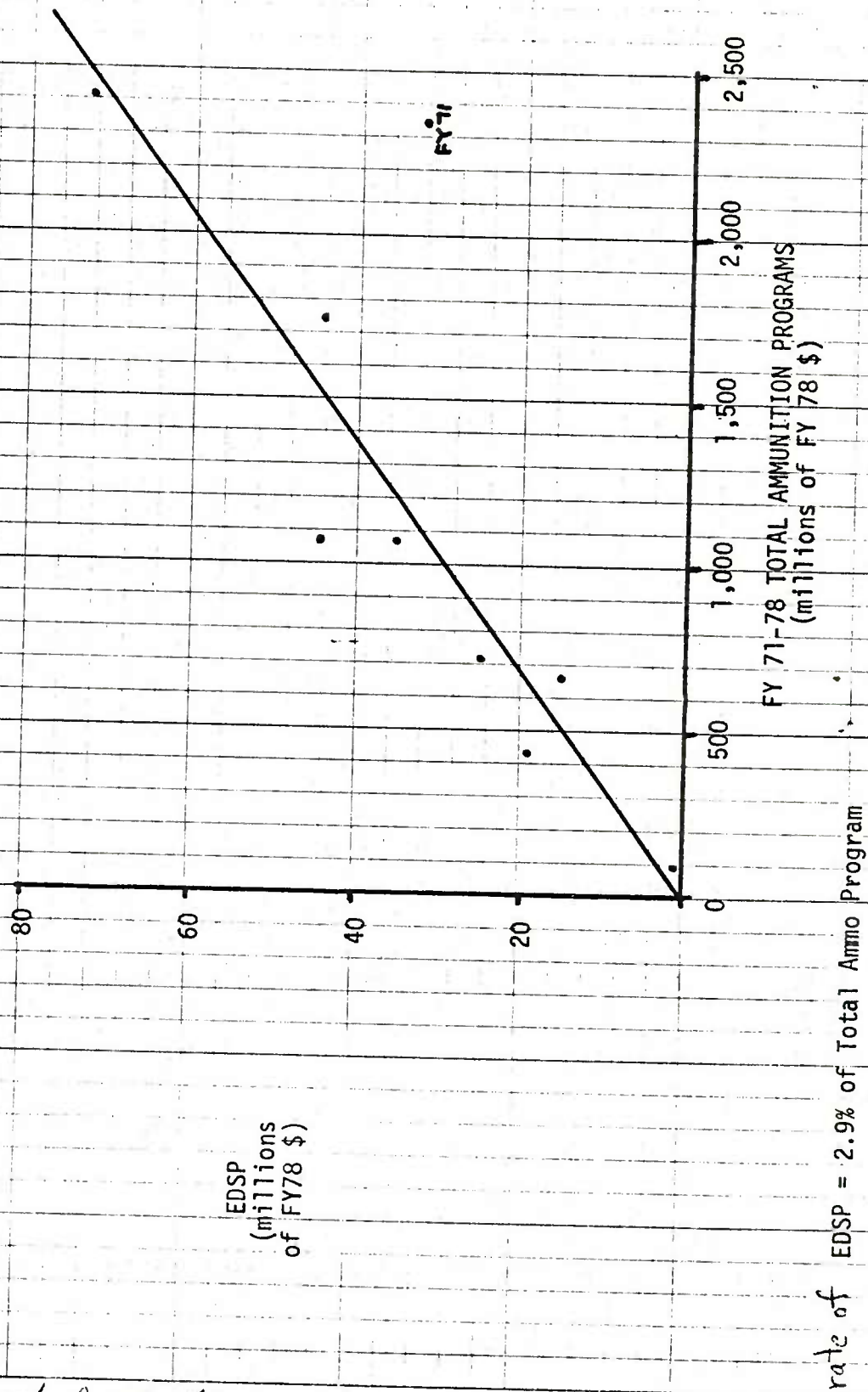
Sources: Budget Estimate Supporting Documentation for the
Class V Ammunition Support Engineering Program:

1. FY 75 Documentation
FY 78 Documentation, Analysis Sheets:
2. Dated 4 Oct 74
3. Dated 4 Oct 74
4. Dated 17 Jun 75
5. Dated 7 Aug 75
6. Dated 12 Aug 76

Original data from these sources were inflated to FY 78 dollars using
DRSAR-CPE Inflation Guidance dated 25 Jan 78.

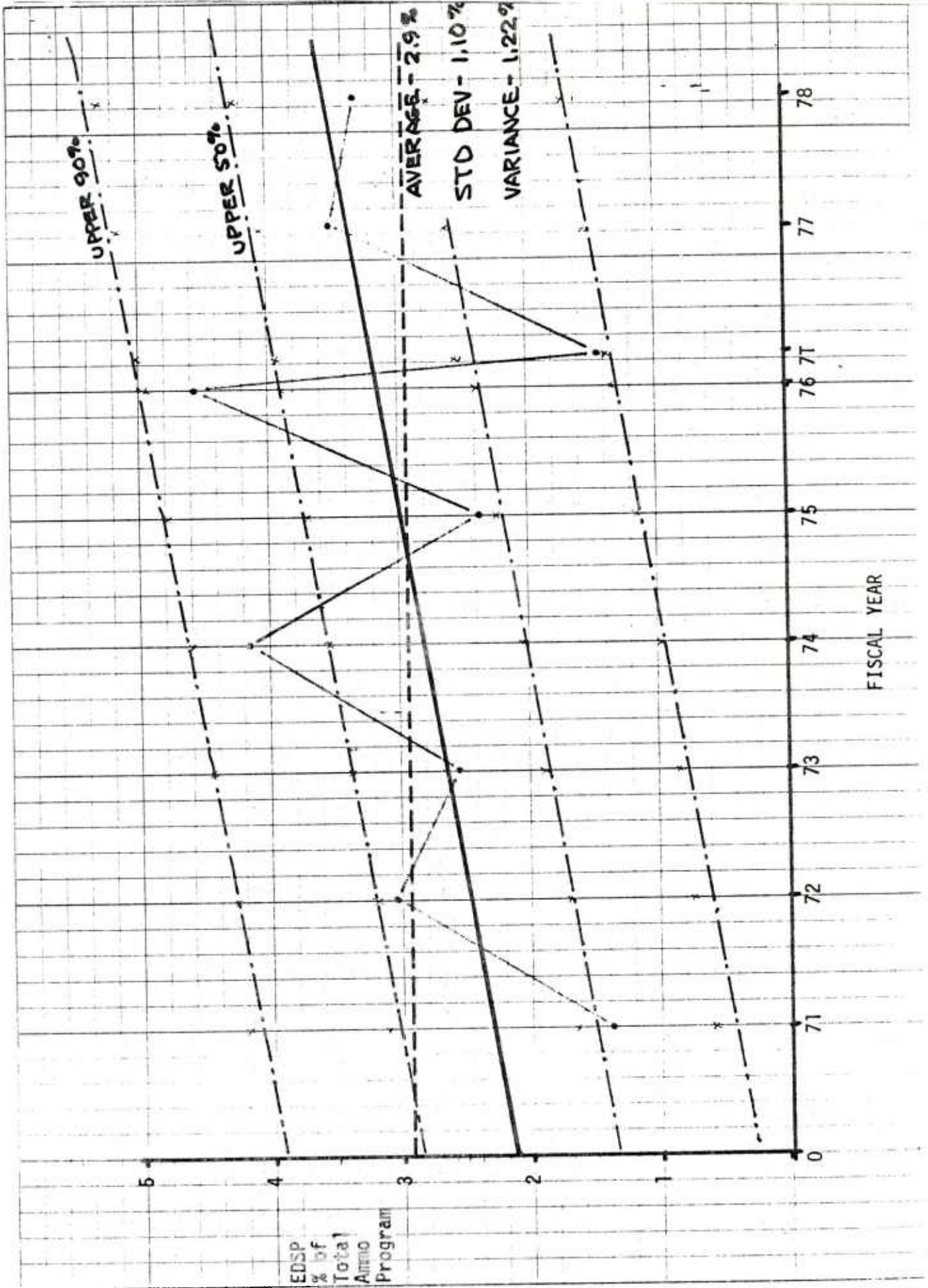
Incl 5 of Incl 5

Incl 6 of Incl 5



rate of EDSP = 2.9% of Total Ammo Program

Source: PA, A Budget Estimate Supporting Documentation for FY 75 and FY 78.
Inflation Factors From DRSAR-CPE Inflation Guidance Date 25 Jan 78.



Incl 7 of Incl 5

NO. OF
COPIES

DISTRIBUTION LIST

1	Commander
2	US Army Materiel Development and Readiness Command
	ATTN: DRCRE
	DRCPA-S
	5001 Eisenhower Avenue
	Alexandria, VA 22333
1	Commander
1	US Army Armament Materiel Readiness Command
1	ATTN: DRSAR-CG
1	DRSAR-DCG
1	DRSAR-LC
1	DRSAR-LE
1	DRSAR-LEP (Tech Lib)
1	DRSAR-CP
20	DRSAR-SA
1	DRSAR-DA
1	DRSAR-PA
1	DRSAR-PC
1	DRSAR-PD
1	DRSAR-IM
1	DRSAR-OP
1	DRSAR-QA
1	DRSAR-IS
1	DRSAR-MM
1	DRSAR-MA
1	DRSAR-AS
1	DRSAR-SF
	Rock Island, IL 61299
1	Commander
	US Army Armament Research and Development Command
	ATTN: DRDAR-SEA
	Dover, NJ 07801
1	Commander
	US Army Test and Evaluation Command
	ATTN: DRSTE-SY
	Aberdeen Proving Ground, MD 21005
1	Commander
	US Army Electronics Command
	ATTN: DRSEL-SA
	Fort Monmouth, NJ 07703
1	Commander
	US Army Missile Materiel Readiness Command
	ATTN: DRSMI-D
	Redstone Arsenal, AL 35809

NO. OF
COPIES

DISTRIBUTION LIST (Cont)

1	Commander US Army Missile Research and Development Command ATTN: DRDMI-DS Redstone Arsenal, AL 35809
1	Commander US Army Tank-Automotive Materiel and Readiness Command ATTN: DRSTA-S Warren, MI 48090
1	Commander US Army Tank-Automotive Research and Development Command ATTN: DRDTA-V Warren, MI 48090
1	Commander US Army Troop Support and Aviation Materiel Readiness Command ATTN: DRDAV-BC P.O. Box 209 St. Louis, MO 63166
1	Commander US Army Aviation Research and Development Command ATTN: DRSTS-F 4300 Goodfellow Blvd St. Louis, MO 63120
1	Project Manager for Cannon Artillery Weapons Systems ATTN: DRCPM-CAWS Dover, NJ 07801
1	Commander US Army Development and Readiness Command Office of the Project Manager for Selected Ammunition ATTN: DRCPM-SA Dover, NJ 07801
1	Project Manager for M110E2 ATTN: DRCPM-M110E2 Rock Island, IL 61299
1	Project Manager for Air Defense Gun Systems ATTN: DRCPM-ADG Rock Island, IL 61299
1	Product Manager for Production Base Modification and Expansion ATTN: DRCPM-PBM Dover, NJ 07801

NO. OF
COPIES

DISTRIBUTION LIST (Cont)

1	Product Manager for Advanced Attack Helicopter Systems US Army Aviation Systems Command St. Louis, MO 63166
1	Product Manager for AH-1 Cobra Series Aircraft US Army Development and Readiness Command P.O. Box 209 St. Louis, MO 63166
1	Commander Rock Island Arsenal ATTN: SARRI-CO Rock Island, IL 61299
1	Commander Watervliet Arsenal ATTN: SARWV-CO Watervliet, NY 12189
1	Commander Human Engineering Laboratories ATTN: DRXHE-D Aberdeen Proving Ground, MD 21005
1	Director US Army Materiel Systems Analysis Activity ATTN: DRXSY-D Aberdeen Proving Ground, MD 21005
1	Commander US Army Mobility Equipment Research and Development Command ATTN: DRDME-O Fort Belvoir, VA 22060
1	Commandant US Army Field Artillery Center Fort Sill, OK 73503
1	Commandant US Army Infantry School Fort Benning, GA 31905
1	Commander US Army Missile and Munitions Center and School Redstone Arsenal, AL 35809

DISTRIBUTION LIST (Cont)

NO. OF
COPIES

1	Commandant US Army Air Defense School Fort Bliss, TX 79916
1	Director US Army Management Engineering Training Agency ATTN: DRXOM-QA Rock Island, IL 61299
2	Director US Army TRADOC Systems Analysis Activity ATTN: ATAA-SL (Tech Lib) White Sands Missile Range White Sands, NM 88002
1	Director Advanced Research Projects Agency 1400 Wilson Boulevard Arlington, VA 22209
1	Commander Defense Logistics Studies Information Exchange Fort Lee, VA 23801
1	Commander US Army Logistics Management Center ATTN: DRXMC-C-SCAD Fort Lee, VA 23801
1	Commander US Army Logistics Center ATTN: ATCL-S Fort Lee, VA 23801
1	Commander ATTN: STECR-TD-TL Cold Region Test Center APO Seattle, WA 98733
12	Defense Documentation Center Cameron Station Alexandria, VA 22314